Claims

1. (Currently amended) A neurostimulator [~~for stimulating excitable tissue~~], comprising:

[~~drive circuitry~~] an ultrasound pulse generator;

an [~~acoustic~~] ultrasound transducer connected to the [~~drive circuitry~~] ultrasound pulse generator; and

an electrode system connected to the ultrasound transducer and the ultrasound pulse generator, wherein the electrode system comprises a plurality of piezoelectric chips, wherein each piezoelectric chip comprises (i) a pair of electrodes [~~driven by the drive circuitry~~], (ii) a piezoelectric material electrically connected to the pair of electrodes; and (iii) a diode in electrical communication with the pair of electrodes and the piezoelectric material [~~; and~~

~~wherein the drive circuitry is configured to generate action potential in neurons via the acoustic transducer and the electrodes~~].

2-3. (Canceled)

4. (Currently amended) The neurostimulator of claim 1 [~~3~~], wherein the piezoelectric chips comprise[~~s~~]:

[~~a piezoelectric element having at least two opposite surfaces;~~

~~a diode;~~]

a biocompatible coating surrounding the piezoelectric element and the diode [~~; and~~ ~~an electrode located adjacent each of the opposite surfaces, where each electrode is partially contained by the biocompatible coating~~].

5. (Currently amended) The neurostimulator of claim 1 [4], wherein the piezoelectric material [~~element~~] includes lead zirconate titanate (PZT).

6. (Currently amended) The neurostimulator of claim 1 [4], wherein the piezoelectric material [~~element~~] includes polyvinylidene fluoride (PVDF).

7. (Currently amended) The neurostimulator of claim 1 [~~3~~], wherein each of the piezoelectric chips has the same resonant frequency [~~further comprising additional piezoelectric chips~~].

8. (Currently amended) The neurostimulator of claim 1 [~~3~~], wherein:

each of the piezoelectric chips has a different resonant frequency [~~; and~~

~~the drive circuitry is configured to drive the acoustic transducer at the resonant frequency of one of the piezoelectric chips~~].

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9-18. (Canceled)

19. (Currently amended) A method of stimulating excitable tissue, comprising directing an ultrasound pulse incident to [~~pressure waves at a piezoelectric chip~~] an electrode system located proximate the excitable tissue, wherein the electrode system comprises a plurality of piezoelectric chips, wherein each piezoelectric chip comprises (i) a pair of electrodes, (ii) a piezoelectric material electrically connected to the pair of electrodes; and (iii) a diode in electrical communication with the pair of electrodes and the piezoelectric material,

wherein the pressure wave is directed to be incident on the piezoelectric chips such that an electric current is generated by each piezoelectric chip, and wherein the electric current is rectified by the diode to a pulse duration proportional to a duration of the ultrasound pulse directed at the electrode system.

20. (Original) A method of preventing transmission of pain signals, comprising stimulating neurons using ultrasound and electric currents.

21. (Currently amended) A method of preventing transmission of pain, comprising directing an ultrasound pulse incident to [~~pressure waves at a piezoelectric chip~~] an electrode system located proximate a nerve, wherein the electrode system comprises a plurality of piezoelectric chips, wherein each piezoelectric chip comprises (i) a pair of electrodes, (ii) a piezoelectric material electrically connected to the pair of electrodes; and (iii) a diode in electrical communication with the pair of electrodes and the piezoelectric material,

wherein the pressure wave is directed to be incident on the piezoelectric chips such that an electric current is generated by each piezoelectric chip, and wherein the electric current is rectified by the diode to a pulse duration proportional to a duration of the ultrasound pulse directed at the electrode system.

22. (Canceled)

23. (Currently amended) The method of claim 19, wherein the excitable tissue is [~~A method of stimulating~~] the pudental nerve [~~, comprising directing pressure waves at a piezoelectric chip located proximate the pudental nerve~~].

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